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ROUTING		OXC-0716-67	
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PLANS			
HOLD FOR:		6 June 1967	
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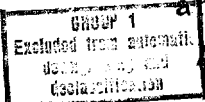
MEMORANDUM FOR THE RECORD

SUBJECT : Review of Life Support Aspects of a Recent
SR-71 Accident.

1. The official accident board's report on the SR-71 accident, which occurred near Las Vegas, New Mexico in April 1967, was reviewed at AFRDR on 31 May 1967. The SR-71 was equipped with the latest ejection seat configuration, referred to as the "stabilized seat". The following is a summary of the experiences, findings and conclusions contained in the accident report.

2. RSO's Experiences

a. RSO's Narrative (summarized): The RSO apparently ejected prior to the pilot while the aircraft was tumbling at an altitude of 30,000 feet. He felt he ejected while the aircraft was inverted. He was very disoriented following ejection and believed he was tumbling end-over-end in the seat since he saw stars, the burning aircraft and ground lights in a cycle. He extended his arms in an attempt to reduce tumbling, felt wind pressure push his hands and arms back, and then felt the tumbling sensation change. Due to his sensation of tumbling he believed the seat-mounted stabilization parachute had failed and feared the man/seat separation device would also fail. He elected to attempt a manual separation but decided not to pull the "scramble" handle, which would have fired his lap belt, cut his foot cables and shoulder harness, and therefore freed him from the seat, because he erroneously believed this would separate him from his emergency oxygen supply. He considered pulling his seat kit release handle (which would have disconnected his oxygen), but realized this action would not accomplish seat separation. He chose to manually open his lap belt and pulled his parachute D-ring. He knew he would still be attached to the seat by the shoulder straps and foot cables, which must be cut to separate, but felt so strongly that the seat had failed that he elected this option anyway. His first pull of the D-ring produced no results



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so he pulled a second time. Simultaneously he separated from the seat and received parachute opening shock. During descent he raised his visor because of fogging, released his seat kit, unsuccessfully attempted to release his spurs, and tried to locate his flotation garment inflation lanyard in case he landed in water. He landed sooner than expected with a very hard impact. He stated he was dragged about 10 feet before his canopy collapsed over a fence. He then released his risers and used a penlight flashlight carried in a suit pocket to see with while he opened his survival kit rucksack and read his survival radio instructions. His survival radio antenna was badly bent. He found one flare and ignited it and found a "strobe" light which he turned on. He believed the "strobe" light was very weak. He established radio contact with a KC-135 and directed them to his position. He was picked up by helicopter shortly thereafter and flown to the Kirtland AFB hospital. Injuries were primarily bruises, abrasions, muscle strain and sprains.

b. Additional Findings and Information:

(1) Examination of the ejection seat components indicated that all had functioned normally, including the stabilization parachute and man/seat separator.

(2) For the first 10 seconds after ejection the stabilization parachute is attached to both the upper and lower corners of the back of the seat. These four risers extend to a swivel linkage which allows the parachute and/or seat to rotate without the danger of the parachute lines twisting up. During this 10 seconds the man/seat mass may travel with the face angled down towards the ground, particularly when ejection may have been from an inverted aircraft. With the normal rotation about the swivel linkage at up to 60 rpm, while angled in an earthward facing direction, the RSO could easily have interpreted this motion as tumbling instead of spinning. It is likely that the lower chute risers were cut (after 10 seconds) with the seat/man assuming a more nearly vertical orientation at about the same time the RSO extended his arms and felt a change in "tumbling".

(3) It is believed that the only reason the RSO separated cleanly from the seat is that the man/seat separator fired and all connections were

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automatically cut. His parachute, which he had manually activated, could only deploy once he had separated. Only luck prevented seat/chute entanglement under these conditions.

(4) While the RSO felt he was only dragged 10 feet after landing, actual measurement showed this distance to be over 700 feet. He may have been dazed by ground impact since his helmet showed evidence of a severe blow having been received on the ground.

(5) The RSO failed to use a number of flares available in the seat kit. The "strobe" light, which he felt had a low output, was clearly observed by rescue aircraft, one of which was at 15,000 feet.

c. Conclusions: The RSO's attempt to get out of the seat and his concern over apparent tumbling, as well as his lack of knowledge of seat kit contents, were attributed to insufficient indoctrination and training. If the sequence of functions and normal experiences expected with the stabilized seat had been completely understood by the RSO, it was felt that he would not have elected his particular course of action which did not end up as disastrously as it could have. He would have been able to assist in his recovery more adequately if he was completely aware of his seat kit contents. The full pressure suit and helmet probably prevented more serious injury during the parachute drag caused by winds in excess of 30 knots. The small penlight carried in the RSO's pocket proved to be very valuable in assisting him to locate and utilize survival equipment.

3. Pilot's Experiences

a. Pilot's Narrative (summarized): The pilot apparently ejected after the RSO while the aircraft was right-side-up. At the point the seat left the aircraft the pilot was aware of a bright illumination which he believed to be the ejection seat rocket blast. His descent on the stabilization chute was smooth and stable and man/seat separation was also smooth. He felt that parachute opening shock was moderately severe. The pilot also opened his visor due to fogging. He did not release his seat kit prior to ground impact, which was described as very hard. The pilot was dragged by winds he estimated

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to be in excess of 30 knots. He could not locate and activate his canopy releases and was therefore dragged over one-half mile before his parachute collapsed over a barbed wire fence. At times while being dragged he was bounced into the air from 3 to 10 feet. He had great difficulty in staying face up and had to continually use his hands and arms to do so. His pressure suit coverall and helmet were severely damaged. He felt he was going to be fatally injured before the parachute finally collapsed. After getting out of his parachute harness he tried unsuccessfully to open his seat kit. He repeatedly tried for 30 minutes or more and finally gave up when he felt he did not really need any of the items. After realizing rescue aircraft would be unable to see him he decided to walk to the aircraft wreckage (he saw the fire 1 to 2 miles away). He was picked up at the wreckage and transported to the Kirtland AFB hospital. He was severely bruised, had severe abrasions and strains, and had second degree burns on his hands and a contusion on his head.

b. Additional Findings and Information

(1) The pilot's gloves, helmet, boots and coverall had various degrees and locations of burns and melting. The left side was more damaged than the right. The parachute pack was severely burned and melted on the left side but the canopy and risers suffered little or no damage. The coverall was torn and the helmet and visors were broken, gouged or otherwise severely damaged.

(2) The ejection seat components all functioned except the lower left stabilization chute riser release. The chute was therefore still attached to the seat at that point. The stabilization chute, risers and lines were melted, burned and fused together in a fashion which prevented the parachute from functioning as designed. The rubber pad on the seat headrest was completely melted and the left side of the seat showed various degrees of heat damage. The lower left riser release mechanism had not fired due to heat damage.

(3) The seat kit release/kit opening handle worked perfectly on the initial trial and all

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subsequent tests after recovery despite moderate drag damage. Some survival items were broken or damaged within the kit. The pilot did not carry a penlight and he did not use his switch-blade knife to attempt to open the kit.

c. Conclusions: It was concluded that the pilot traveled through a fireball of flaming fuel shortly after ejecting. From analysis of damage it was determined that he was exposed to the fireball at about 1 second after ejection (when stabilization chute was deployed) and that the peak temperature encountered was between 1500 and 1800°F. Even though the stabilization parachute was virtually destroyed, the drag of material apparently provided reasonable stabilization. Main parachute opening shock was higher than normal due to the higher terminal velocity related to the reduced drag of the damaged stabilization chute. Ground impact was very hard because the pilot failed to release the seat kit (50 lbs. added weight). The reason the pilot could not open the seat kit on the ground is undetermined, but it is likely that dirt may have clogged the mechanism after being dragged. If so, the dirt, gravel, etc., may have subsequently been dislodged prior to testing. The pilot was undoubtedly saved from severe or fatal injuries, both from the fire and being dragged, by the excellent protection afforded by the full pressure suit/helmet combination. The outer coverall is made of a special high temperature resistant nylon (NOMEX, HT) a design feature to provide protection from flash fires.

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Distribution:

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Cy 1 - ASD/R&D/OSA	9 - [REDACTED] (Life Support Division)
2 - D/R&D/OSA	10 - chrono
3 - D/SA	11 - RB/OSA
4 - D/O/OSA	
5 - D/M/OSA	
6 - OXC/O/OSA	
7 - SAS/O/OSA	
8 - INTEL/O/OSA	

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FORM NO. 241
1 FEB 55

REPLACES FORM 36-8
WHICH MAY BE USED.

(47)

SEC. CL.		ORIGIN		CONTROL NO.	
DATE OF DOC		DATE REC'D		CROSS REFERENCE OR POINT OF FILING	
6 June					
TO		FROM		ROUTING	
SUBJ.		SUBJ.		DATE SENT	
review of late support report		Recent BR-71 Accident.			
Cy 1 - ASD/INM		2 - C/PED/CSA			
3 - D/SA		4 - E/O/CSA			
5 - D/W/CSA		6 - CXC/O/CSA			
7 - SAS/O/CSA		8 - INTEL/O/CSA			
9 - [redacted] (Life Support Div.)					
10 - chronc		11 - RB/CSA			
COURIER NO.		ANSWERED		NO REPLY	
				5	

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